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ABSTRACT

Unfortunately, many students have negative feelings toward mathematics that can lead to math anxiety and subsequent poor performance in or avoidance of mathematics classes. These feelings may have been brought about by negative math classroom experiences, negative parental attitudes toward math, or societal stereotyping of mathematics. The notions that math (1) is a male domain and (2) requires logic, not intuition, are both myths. The learning of mathematics is a developmental process that takes time and practice. Negative attitudes toward or anxiety over mathematics can be altered by establishing a supportive classroom environment, using concrete manipulative materials to help bridge the gap between concrete learning and abstract thought, using a variety of teaching techniques, and addressing the student's personal attitudes toward math. (This guide includes a worksheet that is intended to assist students in confronting their math anxiety. It contains information on how to take charge of one's own study, classroom, and test environments; create success; and distinguish the facts about learning math from the myths.) (MN)

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FROM THEORY TO PRACTICE

BUILDING MATH CONFIDENCE BY OVERCOMING MATH ANXIETY

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Math Anxiety

For many, mathematics arouses strong feelings. The nature of these feelings will affect a person's attitude towards mathematics and can influence the learning of mathematics. Unfortunately, many of these feelings are negative and can lead to math anxiety. The affective domain can be used to address this anxiety. When students can relate mathematics to their daily lives, they begin to relax and to develop an interest and enjoyment in mathematics. Futhermore, their achievement levels are likely to rise.

Math-anxious students often express many negative attitudes as well as fear of mathematics. These may have been brought about by negative math classroom experiences, by negative parental attitudes toward mathematics, or by societal stereotyping of mathematics. This can be altered by (a) establishing a supportive classroom environment, (b) using concrete manipulative materials to help bridge the gap between concrete learning and abstract thought, (c) utilizing a variety of teaching techniques, and (d) addressing the student's personal attitude toward math. The following worksheet was designed to assist students in confronting their math anxiety.

Debunking the Myths

Many myths exist about math that contribute to math anxiety. One is that math is a *male domain*. Many research studies

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on math achievement reported significant differences between males and females. Recently, these differences have been explained; males scored higher than females on many achievement tests because they had studied more math. Yet, today many women are pursuing mathematics and careers which rely on mathematics. When females have the same math background as males, there is no difference in their achievement.

In today's highly technological society, a knowledge of mathematics is crucial. Fear and/or avoidance of mathematics can severely limit ones career options. Significantly, most of the higher paying jobs require a knowledge of mathematics.

The statement that *math requires logic, not intuition* is also a myth. It is important to use both intuition and logic in mathematics. Intuition, which is knowledge that comes to a person through insight, has played a role in many great discoveries. Intuition is creative and helps in approaching problems from another frame of reference. Many times there are a number of ways to do a problem. The "best way" is that which the student understands and which makes sense to that individual.

Learning mathematics is a DEVELOPMENTAL PROCESS which takes time and practice. Memorization is a coping skill which is sometimes used as a learning aid. Once students really understand something, they have learned it and not just memorized it.

Working tensely until problems are solved is not advisable. Students should try to relax with mathematics and give themselves a chance to succeed. Sometimes just putting it away for a while is the best strategy to use when having difficulty. Students should not be allowed to build up anxiety. Instead, they should be encouraged to ask a friend, tutor, or instructor for help in understanding the problem.

To deal with math anxiety, students may find it helpful to look at their own personal math life history. What experiences have they had with mathematics? How have these experiences affected them? The key which should be stressed is for students to get to know (a) themselves, (b) how they learn best, and (c) how to create their own success experiences. By giving themselves time to learn math, students can take charge of their lives and benefit from math learning. Approaching math as an interesting subject, looking for patterns, exploring the natural beauty of geometrical shapes, and allowing the self-expression of feelings can help students to succeed with math.

BUILDING MATH CONFIDENCE

What feelings and thoughts does the word *mathematics* bring to mind for you? How would you answer the question, "If I knew math, I would . . . . " Listed here are various strategies for reducing your math anxiety in order for you to begin to build your confidence in mathematics and related fields.

Take Charge of Your Environment

Study environment. Create a study environment which is comfortable for you. Get to know yourself. Do you study best in total silence or with music? Do you study best in familiar surroundings or in a place like the library? Do you have a problem in making sure that others understand and respect your need for time to study, for a place to study, and for freedom from interruption? Do you need to break old study patterns and establish new ones?

Classroom environment. What type of classroom environment is best for you? Do you prefer a large or a small class? Do you need to sit near the teacher to be on top of the work, or do you need to hide in a less visible spot?

Test environment. What happens to you while taking a test? Do you need to change your seat to prevent being sidetracked by those who finish and leave early? Can you sit in a place where you can do relaxation techniques without bothering others? Are you aware of the effects of caffeine, sugar, and heavy foods on your performance?

Create Success

We know from common sense and our experiences that success creates success. Additionally, this is verified by research. Examine your messages about success to learn how YOU measure success. Here are some suggestions for creating your successful experiences.

1. Think about how you are most comfortable learning? Do you learn best by listening to a lecture, by reading and studying alone, or by interacting with people and materials?
2. Explore a variety of approaches to determine how you learn best. Experiment with learning in different ways such as in study groups, by individual study, with a tutor, or by working with manipulative materials.
3. Once you know how you learn best, pick a class that meets your learning style.
4. Start with both classes and materials that meet you learning level. This will enable you to begin to build your confidence for understanding the basics of math.
5. Allow yourself time to learn and study mathematics. Learning mathematics is a developmental PROCESS which takes TIME.
6. Begin to think about how valuable math is in your life. It is important for career options, consumer issues, and feelings of comfort around financial matters. People who believe that math will be useful in their lives tend to have higher achievement in mathematics and to enjoy math more.

Do You Believe?

We often let our ideas about math and mathematicians block our learning process. How do you feel about each of the following statements?

1. Math requires logic, not intuition.
2. Some people have a math mind, and others do not.
3. There are magic keys to doing math.
4. It is bad to count on your fingers.
5. Math is not creative.
6. Math requires lots of memorization.
7. Most people do not have to know math to succeed in their daily living.
8. In doing math, it is important to get the answer exactly right.
9. Math problems are done by working constantly until the problem is solved.
10. There is always a best way to do a math problem.